To: Distribution: LTP Community

From: Steve Irick

Date: 24 October, 2000

Re: LTP surface data format change

It was clear from the Metrology Workshop this year that many different ways of measuring the surface of long synchrotron mirrors continue to be developed. Regardless of the way the surface data is obtained, the end product is a surface representation in the form of a digital data file. Consensus at the end of the workshop was to have a common format which represents the surface that any instrument may measure.

In compliance with this consensus the ALS Optical Metrology Lab (OML) is changing the format for the Long Trace Profiler (LTP) surface data files. As explained in previous memos for a suggested format[1], each file consists of a header and a data section. The data section is not changed, but the header resembles the format started by Peter Takacs and Continental Optical Corp. years ago. In fact, LTP programs that use Continental's format will be able to read this new format as long as they can ignore lines that were assumed to be blank and the words "Previous:" and "History:". There are two reasons why the ALS OML is doing this.

1. Information about the measurement conditions (calibration factor, scan speed, etc.) had to be recorded in the surface data file because the intensity data files tend to be large and therefore overwritten, losing the original information about conditions.
2. Clients who want the surface data file along with the profile plot of their measured item will now be able to understand the header information without referring to a separate "Rosetta stone". Some lines in Continental's header begin with a descriptive phrase, then a colon, then the information. This idea is extended to most of the header lines in the new format.

An example of this new format is on the next page. Each blank line is indicated by the line number with a subscript size. Comments only for this document have subscript size and are placed at the extreme right of the line. The ALS OML program (LTPw) makes extensive use of string parsing functions that assign many data on one line to their respective variables. LTPw now reads this new format and the older ALS format as well as Continental's format.

The ALS OML intensity data files are also being changed[2]. This is of no consequence to people outside the OML, unless intensity data files need to be communicated with others. The header is increased to 40 lines. Extra information in the new header includes calibration factor, type of scan (stability or measurement), time resolution and time sampling interval and margin (if stability scan), encoder resolution and sampling interval and margin and speed (if measurement scan), camera type and optical system details. The intensity data files remain written in ASCII text, with the option for abbreviated or complete patterns.

References

1. "LTP Measurement Scan Conventions," Memo to the LTP Community at Large; 18 January, 1994.

2. "LTP intensity data format change," Memo to the LTP Community at Large; 11 October, 2000.

LTPw Surface Data Archive Example

```
LTPII ALS_22Sep00                                  Instrument type and file format version
Surface data                                       Blank in Continental's format
cvr8.dat                                           This file's filename
Monday, 2 Oct 2000; 17:23:35                       Last modification date, time
5                                                  Comment line if not blank
Number of data: 361
Previous: cvr8.int                                 Previous file's filename
Monday, 2 Oct 2000; 17:10:12                       Previous file's date, time
History: I2S MB2 AV4 OED                           Detrend history mnemonics
Data type: SLOPE                                   A second datum here if radius is invalid
Step size: 1.000000                                Intended dx or dt
X unit: mm                                         [mm] or [s] in ALS LTP
Z unit: rad
Piston: 0.000000e+000                              Thus far removed [mm]
Tilt: 0.000000e+000                                Thus far removed []
Curvature: 0.000000e+000                           Thus far removed [1/mm]
17
18
19
20
Focal length: 1250.00                              Remaining lines blank in Continental's header
Optical mult: 1.06031                              AKA calibration factor
Wavelength: 0.000670
Temperatures: 21.57,21.63                          initial, final [degrees C]
Scan type: MEAS                                    MEAS (vs x) or STAB (vs t)
X resolution: 0.0006328                            scan resolution [mm] or [s]
Margin,speed or Margin: 10.00000,3.00000           [mm],[mm/s] if MEAS; [s] if STAB
Camera type: Cronin dual opposed array, EPP
29
30
31
32
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35
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38
39
*Data starts.                                      Last line of the header
0.098000    2.664883e-002     d                    First line of data
1.126000    2.662266e-002     d
2.085000    2.659979e-002     d                    Each line contains x, z, a
3.117000    2.657447e-002     g                    where a is the attribute byte:
4.141000    2.654790e-002     g                    'g' = good datum
5.105000    2.652831e-002     g                    'd' = discarded datum for analysis
6.132000    2.650213e-002     g                    'b' = bad datum from measurement
      .
      .
      .
359.118988  1.773307e-002     g                    Delimiters may be a comma or whitespace
360.132996  1.770480e-002     g
```